

WHAT IS CLAIMED IS:

1. A liquid jetting pump comprising:

a mounting cap 2 fitted to a container neck portion;

a cylinder 3 fixed to a container through said cap 2 and including a suction valve 9 provided in a lower edge part extending downward within said container;

a stem 28 which has an annular piston 27 fitted to the interior of said cylinder 3 and protruding from a lower part of the outer periphery thereof and is so provided as to be vertically movable;

a push-down head 30, with a nozzle 29, so provided in continuation from an upper edge of said stem 28 as to be vertically movable above said mounting cap 2;

a discharge valve 31 provided in an upper part within said stem 28; and

a coil spring 38 for always biasing upward a vertically movable member 4 constructed of said stem and said push-down head,

liquid within said container being sucked into said cylinder 3 through said suction valve 9, and a liquid within said cylinder 3 being jetted out of said nozzle 29 via said discharge valve 31 from the stem by moving said vertically movable member 4 up and down,

wherein a plurality of ribs 10 for securing the lower edge of said coil spring 38 are arranged at a lower edge part within said cylinder 3 in a protruded state in a peripheral direction, and liquid passageways 50 passing both on an inner side and on an outer side of the lower edge of said coil spring 38 are provided between said plurality of ribs.

2. A liquid jetting pump according to claim 1, wherein an engagement recessed portion 11 for receiving and securing the lower edge of said coil spring 38 is provided to the upper surface of said ribs.

3. A liquid jetting pump according to claim 2, wherein said vertically movable member 4 is so constructed as to be capable of engagement by push-down, said engagement recessed portion 11 is formed as an engagement recessed portion 11 with its inside surface and upper surface opened, a flange 21 fixedly fitted to the lower edge part of each of said engagement recessed portions 11 is protruded from an outer periphery of a lower edge of a topped peripheral wall 20 and a window hole 23 communicating with an interior and an exterior is formed

in said peripheral wall 20, and there is provided a cylindrical member 19 constructed so that an outer periphery of an upper edge of said peripheral wall 20 can be liquid-tightly fitted to an inner surface of the stem lower edge in a push-down engaged state.

4. A liquid jetting pump according to claim 3, wherein an auxiliary spring 26 is interposed between said cylindrical member 19 and a valve member 18 of said suction valve 9, and said suction valve member 18 is thereby always biased in a valve closing direction.

5. A liquid jetting pump constructed to suck a liquid within a container on which the pump is mounted and jet the liquid out of a nozzle 25 protruding forwardly of a push-down head 26 by pushing down said head 26,

wherein said nozzle 25 is so formed as to ascend forward obliquely, and there is provided a discharge valve 241 housing a ball-like valve member 243 for closing a valve seat 242 provided at a proximal edge part within said nozzle 25, said valve member 243 being movable back and forth within said nozzle 25.

6. A liquid jetting pump comprising:

a mounting cap 202 fitted to a container neck portion;

a cylinder 203 fixed to a container through said cap 202 and including a suction valve 209 provided in a lower edge part extending downward within said container;

a stem 222 provided so that said stem 222 is vertically movable in a central portion within said cylinder in an upward biased state;

an annular piston 223 having its outer peripheral surface slidably fitted to the inner surface of said cylinder 203 and connected to a lower part of the outer surface of said stem 222 to permit a flow of liquid in the inner peripheral surface lower part;

an annular auxiliary piston 224 so fitted to the lower part of the outer periphery of said stem as to be vertically movable at a predetermined stroke, having its outer peripheral surface slidably attached to the inner surface of said annular piston and formed so that a through-hole 229 holed in a peripheral wall portion of said stem is openable and closable;

a head 226, with a nozzle 225, so provided in continuation from an upper edge of said stem as to be

vertically movable above said mounting cap; and

a discharge valve 241 incorporating a ball-like valve member 242 to make a valve member 243 movable back and forth within said nozzle, said valve member 243 serving to close valve seat 242 provided at a proximal edge part within said nozzle 225 protruding forwardly of said head 226,

the liquid within said cylinder being led into said stem via said opened through-hole 229 and jetted out of said nozzle 225 through a discharge valve 241 by pushing down said push-down head, and the liquid within said container being sucked into said cylinder through a suction valve 209 by negative-pressurizing the interior of said cylinder when said push-down head 226 is raised,

wherein said through-hole 229 can be closed by said auxiliary piston 224 only in a maximum ascent position of said stem.

7. A liquid jetting pump according to claim 6, wherein said auxiliary piston 224 is capable of engaging with said cylinder 203 in the closed state of said through-hole 229 in the maximum ascent position of said stem 222 but capable of disengagement after said through-

hole 229 has been opened by pushing down said head 226.

8. A liquid jetting pump comprising:

a mounting cap 302 fitted to a container neck portion;

a cylinder 303 fixed to a container through said cap and including a suction valve 309 provided in a lower edge part extending downward into said container;

a stem 323 which has an annular piston 322 fitted to an interior of said cylinder 303, and protruding from a lower part of an outer periphery and is so provided as to be vertically movable in an upward-biased state;

a push-down head 325, with a nozzle 324, disposed in continuation from an upper edge of said stem 323 and so provided as to be vertically movable above said mounting cap 302; and

a discharge valve 326 provided with a valve member 331, for closing a valve hole formed in an inner upper part of said stem 323, so provided as to be vertically movable by a liquid pressure,

a liquid within said container being sucked into said cylinder 303 through said suction valve 309, and a liquid within said cylinder 303 being jetted out of said nozzle

324 through said discharge valve 326 from said stem by vertically moving a vertically movable member 304 constructed of said stem 323 and said push-down head 325,

wherein a vertical stroke of said discharge valve member 331 is regulated so that $V_b - V_c$ is equal to or larger than V_a , wherein V_a is the volumetric capacity of said nozzle 324, V_b is the volumetric capacity of the liquid passageway where said discharge valve member 331 is vertically movable, and V_c is the volume of said discharge valve member 331.

9. A liquid jetting pump according to claim 8, wherein said suction valve 309 is a suction valve 309 including a valve member 317 always biased in a valve hole closing direction by a resilient member 316.

10. A liquid jetting pump according to claim 8, wherein said suction valve 309 is a suction valve 309 constructed of a dome-like valve plate 337, formed with a slit 336, for closing an opening of the lower edge of said cylinder 303 by fixedly fitting a lower edge periphery to an inner lower edge part of said cylinder 303.

11. A liquid jetting pump according to claim 8, wherein said suction valve 309 is a suction valve 309 constructed of a hollow truncated cone proximal portion 339, with its lower edge surface opened, for closing an opening of the lower edge of said cylinder 303 by fixedly fitting a lower edge periphery thereof to an inner lower edge part of said cylinder 303, and an elastic cylinder 341 so closely attached to an outer periphery of the wall of said proximal portion so as to be incapable of coming off and to liquid-tightly close a window hole 340 holed in the peripheral wall of said proximal portion 339.

12. A liquid jetting pump comprising:

a mounting cap 402 fitted to a container neck portion;

a cylinder 403 fixed to a container through said cap 402 and including a suction valve 409 provided in a lower edge part extending downward within said container;

a stem 422 provided so that said stem is vertically movable in a central portion within said cylinder in an upward biased state and having a discharge valve 427 in which a valve hole formed in an inner upper part is closed by a valve member 439 vertically movable by a liquid

pressure;

an annular piston 423 having its outer peripheral surface slidably fitted to the inner surface of said cylinder 403, and connected to a lower part of the outer surface of said stem 422 to permit a flow of liquid in the inner peripheral surface lower part;

an annular auxiliary piston 424 so fitted to the lower part of the outer periphery of said stem as to be vertically movable at a predetermined stroke, having its outer peripheral surface slidably attached to the inner surface of said annular piston and formed so that a through-hole 431 holed in a peripheral wall portion of said stem is openable and closable; and

a head 426, with a nozzle 425, so provided in continuation from an upper edge of said stem as to be vertically movable above said mounting cap,

the liquid within said cylinder being led into said stem via said opened through-hole 431 and jetted out of said nozzle 425 through said discharge valve 427 by pushing down said push-down head, and the liquid within said container being sucked into said cylinder through a suction valve 409 by negative-pressurizing the interior of said cylinder when said push-down head 426 is raised,

wherein said through-hole 431 can be closed by said auxiliary piston 424 only in a maximum ascent position of said stem.

13. A liquid jetting pump according to claim 12, wherein a vertical stroke of said discharge valve member 439 is regulated so that $V_b - V_c$ is equal to or larger than V_a , wherein V_a is the volumetric capacity of said nozzle 455, V_b is the volumetric capacity of the liquid passageway where said discharge valve member 439 is vertically movable, and V_c is the volume of said discharge valve member 439.

14. A liquid jetting pump according to claim 12, wherein a suction valve member 417 constituting said suction valve 409 is always biased in a valve hole closing direction.

15. A liquid jetting pump according to claim 12, wherein said auxiliary piston 424 is always biased upward with respect said stem 422, and said through-hole 431 can be closed by said auxiliary piston 424 only when said stem 422 is raised at the maximum.

16. A liquid jetting pump according to claim 12, wherein said auxiliary piston 424 is capable of engaging with said cylinder 403 in a closed state of said through-hole 431 in the maximum ascent position of said stem 422 but capable of disengaging after said through-hole 431 has been opened by pushing down said head 426.

17. A liquid jetting pump comprising:

a mounting cap 502 fitted to a container neck portion;

a cylinder 503 fixed to a container through said cap and including a suction valve 510 provided in a lower edge part extending downward into said container;

a stem 521 having an annular piston 520 fitted to an interior of said cylinder and protruding from a lower part of an outer periphery, and so provided as to be vertically movable in an upward-biased state;

a push-down head 523, with a nozzle 522, disposed in continuation from an upper edge of said stem and so provided as to be vertically movable above said mounting cap 502; and

a discharge valve 524 provided with a valve member 530 for closing a valve hole by placing it on a valve seat

529 provided on an inner upper part of said stem,

a liquid within said container being sucked into said cylinder through said suction valve, and a liquid within said cylinder being jetted out of said nozzle through said discharge valve from said stem by vertically moving a vertically movable member 504 constructed of said stem and said push-down head,

wherein a bar-like member 505 with its upper edge part protruding into said stem is provided, a tip of said bar-like member is in a lower position of said valve seat 529 of said discharge valve in the maximum ascent position of said vertically movable member 504, the tip of said bar-like member protrudes with a gap along the periphery upwardly of said valve seat 529 by pushing down said vertically movable member, and the liquid existing downstream of said discharge valve flows back upstream of said discharge valve via the gap when said vertically movable member 504 is raised.

18. A liquid jetting pump according to claim 17, wherein said suction valve is a suction valve 510a including a valve member 519 always biased in a valve hole closing direction by a resilient member 539.

19. A liquid jetting pump according to claim 17, wherein said suction valve is a suction valve 510b including a suction valve member 519b having a weight that is more than twice the weight of said discharge valve member 530.

20. A liquid jetting pump comprising:

a mounting cap 602 fitted to a container neck.

portion;

a cylinder 603 fixed to a container through said cap and having its lower edge part extending downward into said container;

a bar-like suction valve member 605 having its lower surface closely fitted onto a valve seat 613 provided in an inner lower part of said cylinder to form a suction valve 617 and erecting upward so as to be vertically movable at a predetermined stroke;

a stem 622 which has an annular seal portion 627 with its inner peripheral edge liquid-tightly slidably fitted to the outer periphery of said member 605, protruding from a lower edge of the inner periphery and is vertically movable in an upward biased state;

an annular piston 623 so fitted to a lower edge part

of the outer periphery of said stem as to be vertically movably at a predetermined stroke, having its outer peripheral edge slidably attached to the inner surface of said cylinder and formed so that a through-hole 631 holed in the lower edge part of said stem is openable and closable; and

a push-down head 625, with a nozzle 624, provided in continuation from an upper edge of said stem 622 so as to be vertically movable above said mounting cap 602,

a liquid within said cylinder 603 being led into said stem via said opened through-hole 631 by pushing down said push-down head, and a liquid in said container being sucked up into said cylinder by negative-pressurizing the interior of said cylinder,

wherein said liquid jetting pump comprises a discharge valve 626 in which a valve hole formed in an inner upper part of said stem is closed by a valve member 637 vertically moved by a liquid pressure, said suction valve member 605 including a vertical groove 640 for a liquid backflow that is formed along its outer periphery.

21. A liquid jetting pump according to claim 20, wherein a vertical stroke of said discharge valve member

637 is regulated so that $V_b - V_c$ is equal to or larger than V_a , wherein V_a is the volumetric capacity of said nozzle 624, V_b is the volumetric capacity of the liquid passageway where said discharge valve member 637 is vertically movable, and V_c is the volume of said discharge valve member 637.

22. A liquid jetting pump according to claim 20, wherein said suction valve member 605 is a suction valve member 605 always biased in a valve hole closing direction by a resilient member 641.

23. A liquid jetting pump comprising:

a mounting cap 702 fitted to a container neck portion;

a cylinder 703 fixed to a container through said cap and including a suction valve 714 provided in a lower edge part extending downward into said container;

a stem 717 having its lower edge surface closed and provided so that said stem is vertically movable in a central portion within said cylinder in an upward biased stat and including a discharge valve 721 with a valve hole so holed in an upper part of the interior as to be

closed by a valve member 722 vertically moved by a liquid pressure;

an annular piston 718 so fitted to a lower edge part of the outer periphery of said stem as to be vertically movable at a predetermined stroke, having its outer peripheral surface slidably fitted to the inner surface of said cylinder and so provided as to be make openable closable a through-hole 728 holed in the lower edge part of said stem; and

a head 720, with a nozzle 719, so provided in continuation from an upper edge of said stem as to be vertically movable above said mounting cap,

a liquid within said cylinder being led into said stem via said opened through-hole 728 and jetted out of said nozzle 719 through a discharge valve 721 by pushing down said push-down head, and the liquid within said container being sucked into said cylinder through a suction valve 714 by negative-pressurizing the interior of said cylinder when said push-down head 720 is raised,

wherein said annular piston 718 is always biased upward with respect to said stem, and said through-hole 728 is so formed as to be closable only in a maximum asc nt position of said stem.

24. A liquid jetting pump according to claim 23, wherein a vertical stroke of said discharge valve member 722 is regulated so that $V_b - V_c$ is equal to or larger than V_a , wherein V_a is the volumetric capacity of said nozzle 719, V_b is the volumetric capacity of the liquid passageway where said discharge valve member 722 is vertically movable, and V_c is the volume of said discharge valve member 722.

25. A liquid jetting pump comprising:

a mounting cap 822 fitted to a container neck portion;

a cylinder 803 fixed to a container through said cap and including a suction valve 814 provided in a lower edge part extending downward into said container;

a stem 820 provided so that said stem is vertically movable in a central portion within said cylinder in an upward biased state and including a discharge valve 824 with a valve hole so holed in an upper part of the interior as to be closed by a valve member 826 vertically moved by a liquid pressure, said stem 820 being provided with said discharge valve 824 closed by said valve member 826 vertically movable at a predetermined stroke in a

lower part of the outer periphery of said stem;

an annular piston 821 so fitted to a lower edge part of the outer periphery of said stem as to be vertically movable at a predetermined stroke, having its outer peripheral surface slidably fitted to the inner surface of said cylinder and so provided as to be made openable closable a through-hole 836 holed in the peripheral wall of said stem; and

a head 823, with a nozzle 822, so provided in continuation from an upper edge of said stem as to be vertically movable above said mounting cap,

a liquid within said cylinder being led into said stem via said opened through-hole 836 and jetted out of said nozzle 822 through a discharge valve 824 by pushing down said push-down head, and the liquid within said container being sucked into said cylinder through a suction valve 814 by negative-pressurizing the interior of said cylinder when said push-down head 823 is raised,

wherein said liquid jetting pump comprises a check valve 825, provided in the lower edge part of said stem, for permitting a one-way flow into said cylinder from within said stem.

26. A liquid jetting pump according to claim 25, wherein a vertical stroke of said discharge valve member 826 is regulated so that $V_b - V_c$ is equal to or larger than V_a , wherein V_a is the volumetric capacity of said nozzle 822, V_b is the volumetric capacity of the liquid passageway where said discharge valve member 826 is vertically movable, and V_c is the volume of said discharge valve member 826.

27. A liquid jetting pump according to claim 25, wherein said check valve 825 is a check valve 825 for integrally and vertically movably supporting a valve plate 832 closing the a lower surface of a valve hole holed in a bottom wall of said stem by use of a plurality of bar-like elastic portions 833 protruding from an inner surface of a cylindrical proximal portion 831 fixedly fitted to the lower edge of said stem,

wherein said discharge valve 814 is a discharge valve 814 for integrally and vertically movably supporting a valve plate 815 closing an upper surface of a valve hole holed in the lower edge part of the interior of said cylinder by use of a plurality of bar-like elastic portions 817 integrally protruding from the inner surface

of a cylindrical proximal portion 816 fixedly fitted to the lower edge part of the interior of said cylinder, and a pressure required for opening said check valve 825 is smaller than a pressure required for opening said suction valve 814.

28. A liquid jetting pump according to claim 27, wherein engagement protrusions 845, 846 for regulating a stroke of the vertical movement of each valve plate are protruded in a predetermined position under said check valve plate 832 and in a predetermined position above said suction valve plate 815.

29. A pump type liquid discharge container comprising:

a mounting cylinder 902 attached to an outer surface of a container neck portion;

a cylinder 903 having a suction valve 907 provided on an inner surface of a bottom portion and extending downward into said container from said mounting cylinder;

an operating member 930, with a discharge valve, erected from within said cylinder by biasing it upward; and

a push-down head 931, with a nozzle 934, provided at an upper edge of said operating member, a liquid in the container being sucked into said cylinder and a liquid in the cylinder being jetted out of the nozzle 934 by vertical movement of said operating member,

wherein a suction valve 907 in a bottom portion within said cylinder is constructed of a self-closing valve with a valve hole 910 resiliently closed by a valve member 911,

said operating member 930 is constructed of said push-down head 931, a stem 935 having a small-diameter cylinder 938 extending downward through an outward flange 937 from a lower edge of a cylindrical portion 936 extending downwards into said cylinder 903 while fixing its upper edge part to said push-down head, a lower member 940 provided with a large-diameter board portion 943 at a lower edge of a bar-like portion 942 extending downward while fixing its upper part into said cylindrical portion 936 and provided vertically with a passageway forming groove 941 in its outer surface and a cylindrical piston 950 including an inner cylindrical portion 951 fitted to the outer surface of said bar-like portion so as to vertically movable between said outward flange 937 of said

stem and said board-like portion 943,

said cylindrical piston is formed in a triple cylindrical shape connected through a flange, an outer cylindrical portion 953 being water-tightly fitted to a wall surface within said cylinder and an upper part of a middle cylindrical portion 952 being water-tightly fitted to an inner wall surface of said small-diameter cylinder 938,

the interior of the upper part of said middle cylindrical portion communicates with said passageway forming groove 941,

a discharge valve 944 is formed of the lower edge part of said middle cylindrical portion 952 and of the outer peripheral part of said board-like portion 943, and

a friction resistance of said cylindrical piston 950 with respect to the inner wall surface of said cylinder 903 is set larger than a friction resistance with respect to said bar-like portion 942 and said small-diameter cylinder 938 as well.